Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R3PPDF **Ponderosa Pine Douglas-Fir - Southern Rockies**

General Information

Contributors *(additional contributors may be listed under "Model Evolution and Comments")*

Modelers		Reviewers	
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Vegetation Type

Forested

Dominant Species*

PIPO
PSME

General Model Sources

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

LANDFIRE Mapping Zones

14 24 28
15 25
23 27

Rapid Assessment Model Zones

- [ ] California
- [ ] Great Basin
- [ ] Great Lakes
- [ ] Northeast
- [ ] Northern Plains
- [ ] N-Cent.Rockies
- [ ] Pacific Northwest
- [ ] South Central
- [ ] Southeast
- [ ] S. Appalachians
- [x] Southwest

Geographic Range

Dominant forest type along the eastern slope of the continental divide but is scarce on the western side of the divide. The montane zone borders the Plains grasslands to the east, and in the foothills of the eastern slope includes shrublands and meadows.

Biophysical Site Description

The montane zone (5500ft - 9500 ft). Lower montane below 7000 ft and upper montane above 7000 ft. Northern Front Range -Ponderosa pine tends to be associated with xeric, south-facing slopes, and Douglas-fir tends to be associated with mesic, north-facing slopes. South of I-70 the southern Front Range toward Pikes Peak, ponderosa pine-Douglas-fir forests exist on all site conditions (i.e., aspects) above 6500 ft elevation. Pure ponderosa pine exists below 6500 ft. Below 6500ft in the southern Front Range is similar to the lower montane of the northern Front Range. Differences exist in the upper montane stands between the northern and southern Front Range.

Vegetation Description

The lower montane zone dominated by ponderosa pine (historically < 30% canopy cover below 6500 m), more dense stands of Douglas-fir on north-facing slopes. The upper montane zone the ponderosa pine cover type occurs both as relatively pure stands, and with significant components of Douglas fir. In the northern FR, typically striking contrast in stand density and species composition on south- as opposed to north-facing slopes. Douglas-fir prominent on north-facing slopes. Structural stages will greatly vary depending on past disturbance history (i.e., 50% cover of Class B would not be outside of the historical range of variability following widespread high-severity fire which has occurred in the past over the last few hundred years prior to the 20th century). In the southern FR, historically most Douglas-fir was confined to north-facing slopes with occasional larger Douglas-fir on other aspects.

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Disturbance Description

Mixed-severity fire regime - typically on average fire frequency range from 40 to 100 years (5-100 ha; Kaufmann et al. 2000, Veblen et al. 2000, Ehle and Baker 2003, Sherriff 2004). These fires range from low severity to high severity fires, and the forest structure was shaped by the pattern of fire at a landscape scale. Drought and other weather events (e.g., blowdown); insects such as mountain pine beetle, Douglas-fir beetle, and western spruce budworm (Negron 1998, 2004; Swetnam and Lynch 1993); and pathogens such as dwarf mistletoe (Hawksworth) also play important roles in this type.

Adjacency or Identification Concerns

Replacement fire rotation uncertain, and this affects the amount of forest in each class. Cheesman Lake -fire rotation (all fires 75 years) and stand-replacement (460 years) estimation.

Scale Description

Sources of Scale Data ☑ Literature ☑ Local Data ☑ Expert Estimate

Northern range -fire history sites range from 1 to 200 ha, average of 100 ha areas for fire regime information over tens of thousands of acres. Southern range -- patch sizes from less than 1 ha to a landscape scale of 35km2 plus.

Issues/Problems

Replacement fire rotation uncertain, and this affects the amount of forest in each class.

Model Evolution and Comments

Additional modelers included Jose Negron (jnegron@fs.fed.us) and Brian Kent (bkent@fs.fed.us).

Peer reviews of this type were generally favorable and no changes were made.

Succession Classes

Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 10 %

Early1 Open

Description

Openings with up to 10% by overstory dominated by ponderosa pine and sometimes Douglas-fir. Some openings may persist.

Indicator Species* and Canopy Position

CERCO
PIPO
PSME
BOGR

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	10 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Class B **10%**

Mid1 Closed

Description

> 50% canopy cover in the northern Front Range (above c. 6500ft) and >30% canopy cover in the southern Front Range. In the northern Front Range, 50% cover of Class B would not be outside of the historical range of variability.

Indicator Species* and Canopy Position

PIPO
PSME

CERCO

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class C **25%**

Mid1 Open

Description

< 50% canopy cover in the northern Front Range (above c. 6500ft) and < 30% canopy cover in the southern Front Range.

Indicator Species* and Canopy Position

PIPO
PSME
CERCO

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class D **40%**

Late1 Open

Description

< 50% canopy cover in the northern Front Range (above c. 6500ft) and < 30% canopy cover in the southern Front Range.

Indicator Species* and Canopy Position

PIPO
PSME
CERCO

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Class E **15 %**

Late1 Closed

Description

> 50% canopy cover in the northern Front Range (above c. 6500ft) and >30% canopy cover in the southern Front Range.

Indicator Species* and Canopy Position

PIPO
PSME
CERCO

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Fuel Model no data

Disturbances

Non-Fire Disturbances Modeled

☐ Insects/Disease
☐ Wind/Weather/Stress
☐ Native Grazing
☐ Competition
☐ Other:
☐ Other:

Fire Regime Group: **3**

I: 0-35 year frequency, low and mixed severity
II: 0-35 year frequency, replacement severity
III: 35-200 year frequency, low and mixed severity
IV: 35-200 year frequency, replacement severity
V: 200+ year frequency, replacement severity

Historical Fire Size (acres)

Avg:
Min:
Max:

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	460			0.00217	15
Mixed	160			0.00625	43
Surface	160			0.00625	43
All Fires	68			0.01467	

Sources of Fire Regime Data

☑ Literature
☑ Local Data
☐ Expert Estimate

References

Brown, P. M., M. R. Kauffman, and W. D. Sheppard. 1999. Long-term, landscape patterns of past fire events in a montane ponderosa pine forest of central Colorado. Landscape Ecology 14:513-532.

Brown, P. M., and W. D. Shepperd. 2001. Fire history and fire climatology along a 5 degree gradient in latitude in Colorado and Wyoming, USA. Palaeobotanist 50:133-140.

Ehle, D. S., and W. L. Baker. 2003. Disturbance and stand dynamics in ponderosa pine forests in Rocky Mountain National Park, USA. Ecological Monographs 73:543-566.

Kaufmann, M. R., L. S. Huckaby, and P. Gleason. 2000. Ponderosa pine in the Colorado Front Range: Long historical fire and tree recruitment intervals and a case for landscape heterogeneity. Pages 153-160 in Proceedings, Joint Fire Science Conference and Workshop, Boise, ID June 1999.

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Kaufmann, M. R., P. J. Fornwalt, L. S. Huckaby, and J. M. Stoker. 2001. Cheesman Lake--A historical ponderosa pine landscape guiding restoration in the South Platte watershed of the Colorado Front Range. Pages 9-18 In: R. K. Vance, C. B. Edminster, W. W. Covington and J. A. Blake, editors. Ponderosa pine ecosystems restoration and conservation: Steps toward stewardship, conference proceedings [Flagstaff, AZ--April 25-27, 2000]. USDA Forest Service Proceedings RMRS-P-22, Rocky Mountain Research Station, Fort Collins, Colorado.

Mast, J. N., T. T. Veblen, and Y. B. Linhart. 1998. Disturbance and climatic influences on age structure of ponderosa pine at the
pine/grassland ecotone, Colorado Front Range. Journal of Biogeography 25:743-755.

Peet, R. K. 1981. Forest vegetation of the Colorado Front Range: Composition and dynamics. Vegetatio 45:3-75.

Sherriff, R. L. 2004. The historic range of variability of ponderosa pine in the northern Colorado Front Range: Past fire types and fire
effects. Ph.D. Dissertation. University of Colorado, Boulder.

Veblen, T. T., and D. C. Lorenz. 1986. Anthropogenic disturbance and recovery patterns in montane forests, Colorado Front Range. Physical
Geography 7:1-24.

Veblen, T. T., T. Kitzberger, and J. Donnegan. 2000. Climatic and human influences on fire regimes in ponderosa pine forests in the Colorado
Front Range. Ecological Applications 10:1178-1195.